Docket No. 1293.1861

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

Kiu-hae JUNG et al.

Application No. 10/673,402 Group Art Unit: 2627

Confirmation No. 3744

Filed: September 30, 2003 Examiner: Aristotelis M. Psitos

For: INFORMATION STORAGE MEDIUM AND METHOD OF RECORDING/REPRODUCING THE SAME

SUBMISSION OF ENGLISH TRANSLATION OF FOREIGN PRIORITY APPLICATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 CFR 1.55(a)(4) and MPEP 201.15, attached hereto are an English translation of Korean Patent Application No. 2002-78167 filed on December 10, 2002, the Korean priority application of the present application, and a Certification of Translation containing a statement that the English translation is accurate to perfect the applicants' claim for foreign priority under 35 USC 119(a)-(d). A certified copy of Korean Patent Application No. 2002-78167 was filed on September 30, 2003, in the present application.

If there are any fees associated with filing of this paper, please charge the same to our Deposit Account No. 503333.

Respectfully submitted,

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Attachments

CERTIFICATION OF TRANSLATION

I, ***Jeong-min Cho***, an employee of Y.P. LEE, MOCK & PARTNERS of Koryo Bldg., 1575-1 Seocho-dong, Seocho-gu, Seoul, Republic of Korea, hereby declare under penalty of perjury that I understand the Korean language and the English language; that I am fully capable of translating from Korean to English and vice versa; and that, to the best of my knowledge and belief, the statement in the English language in the attached translation of ***Korean Patent Application No. 10-2002-0078167*** consisting of *14* pages, have the same meanings as the statements in the Korean language in the original document, a copy of which I have examined.

Signed this 16th day of April 2008

Jeongmin Cho

ABSTRACT

[Abstract of the Disclosure]

Provided are an information storage medium having user data areas and additional data areas, and sync patterns to distinguish the additional data areas from the user data areas, and a method of recording information on and/or reproducing information from the information storage medium. The information storage medium includes a user data area in which user data is recorded and an additional data area located in at least one of areas before and after the user data area. Second sync patterns used in the additional data area are different from first sync patterns used in the user data area.

[Representative Drawing]

FIG. 3

SPECIFICATION

[Title of the Invention]

Information Storage Medium and Method of Recording/Reproducing the Same

[Brief Description of the Drawings]

The above and other features and advantages of the present invention will become more apparent by describing in detail exemplary embodiments thereof with reference to the attached drawings in which:

FIG. 1 illustrates the data structure of a conventional recordable information storage medium such as a CD-R or a CD-RW;

FIG. 2 illustrates the data structure of a recording unit of an information storage medium according to an embodiment of the present invention; and

FIG. 3 illustrates the data structure of the information storage medium.

<Explanation of Reference numerals designating the Major elements of the Drawings>

C...user data area	D...additional data area
11...user data	13...first sync pattern
21...additional data	23...second sync patter

[Detailed Description of the Invention]

[Object of the Invention]

[Technical Field of the Invention and Related Art prior to the Invention]

The present invention relates to an information storage medium having user data areas and additional data areas and a method of reproducing information recorded on the information storage medium, and more particularly, to an information storage medium having an improved structure in which user data areas are distinguished from additional data areas and a method of recording information thereon and/or reproducing information from the information storage medium.

Optical discs are generally used as information storage media of optical pickup devices which record information on and/or reproduce information from the optical discs

without contacting the optical discs. Optical discs are classified as either compact discs (CDs) or digital versatile discs (DVDs) according to their information recording capacity. Optical discs can also be classified as either recordable discs or read-only discs according to their recording possibility. Here, the recordable discs include 650MB CD-Rs, CD-RWs, 4.7GB DVD+R/RWs, DVD-random access memories (DVD-RAMs), DVD-R/rewritables (DVD-R/RWs), and so forth. The read-only discs include 650MB CDs, 4.7GB DVD-ROMs, and the like.

FIG. 1 illustrates the data structure of a recordable information storage medium such as a CD-R or a CD-RW. Referring to FIG. 1, the recordable information storage medium includes user data areas A and additional data areas B located before and after the user data areas A. Here, the user data areas A are physical clusters in which data is recorded. The additional data areas B are divided into run-in areas and run-out areas.

The recordable information storage medium having this structure can record data even when a recording position of the information storage medium is changed with a variation in the speed of a spindle motor during rotating of the information storage medium on a turntable.

In a case where a read-only information storage medium is manufactured according to the above-described format, the read-only information storage medium is required to have the same structure as the recordable information storage medium so as to have reproduction compatibility in a drive and a format consistent with the recordable information storage medium. In other words, the read-only information storage medium has to have a structure including user data areas and additional data areas. Here, the additional data areas are located before and after the user data areas and must have the same length as the run-in areas and the run-out areas described with reference to FIG. 1. In this case, the additional data areas have to be separated from the user data areas.

[Technical Goal of the Invention]

The present invention provides an information storage medium having user data areas and additional data areas, and sync patterns to distinguish the additional data areas from the user data areas, and a method of recording information on and/or reproducing information from the same.

[Structure and Operation of the Invention]

According to an aspect of the present invention, there is provided an information storage medium including a user data area in which user data is recorded and an additional data area located in at least one of areas before and after the user data area. Second sync patterns used in the additional data area are different from first sync patterns used in the user data area.

According to another aspect of the present invention, there is provided a method of recording information on and/or reproducing information from an information storage medium. A user data area in which user data is recorded and an additional data area located in at least one of areas before and after the user data area are prepared in the information storage medium. Second sync patterns used in the additional data area are formed differently from first sync patterns used in the user data area.

Referring to FIGS. 2 and 3, an information storage medium according to an embodiment of the present invention includes user data areas C in which user data is recorded and additional data areas D located before and/or after the user data areas C. The information storage medium may be a recordable information storage medium or a read-only information storage medium.

Each of the user data areas C contains a plurality of user data 11 separated by a plurality of first sync patterns 13. The user data areas C are composed of, e.g., error correcting code (ECC) recording units.

Each of the additional data areas D contains a plurality of additional data 21 separated by a plurality of second sync patterns 23. Here, as will be explained later, the first sync patterns 13 have modulation codes corresponding to sync numbers shown in Tables. 1 and 2 and are formed by combining predetermined selected sync numbers. The second sync patterns 23 are formed of predetermined type of patterns denoted by reference numerals 23a and 26b according to the same method as the plurality of first sync patterns 13.

The second sync patterns 23 are different from the first sync patterns 13. In other words, the second sync patterns 23 are formed of patterns which are not used as the first sync patterns 13. By forming the second sync patterns 23 differently from the first sync patterns 13, the additional data areas D can be managed with being certainly differentiating from the user data areas C in a reproducing system.

The number of second sync patterns 23 depends on the length of the additional data areas D. It is preferable that the second sync patterns 23 are arranged at equal intervals in order to increase effective additional data efficiency of the additional data areas D. In addition, sync data can be easily restored during reproducing.

Preferably, the size of each of the plurality of user data 11 in the user data areas C is equal to that of each of the plurality of additional data 21 in the additional data areas D. This structure can be realized by adjusting the positions of the second sync patterns 23.

It is preferable that the entire size of additional data 21 in the additional data areas D be integral multiplies of the size d_1 of user data 11 recorded between two adjacent first sync patterns 13a and 13b. In other words, referring to FIG. 2, the size d_2 of additional data 21 recorded between two adjacent second sync patterns 23a and 23b is equal to the size d_1 of the user data 11, and the additional data 21 are recorded in two parts of each of the additional data areas D. Thus, the total size of the additional data 21 is integral multiplies of, i.e., doubles, the size d_1 of the user data 11. As a result, since sync signals are detected at regular intervals in all areas during reproducing of data, it is advantageous to restore the sync signals.

The structure of the information storage medium using a run-length-limited (RLL) (d, k) code will be described below.

A RLL code indicates how many bits of value "0" exist between two bits of value "1". Thus, the RLL (d, k) code represents that the minimum number and the maximum number of bits of value "0" between two bits of value "1" are d and k, respectively.

In the structure using the RLL (d, K) code, the first sync patterns 13 generally include sync bodies that do not satisfy the RLL (d, k) code and sync identifications (IDs) that satisfy the RLL (d, k) code. In other words, the sync bodies have a run length k + i when i is an integer that is greater than or equal to "1". The sync IDs contain different patterns to distinguish N different sync patterns.

The second sync patterns 23 include sync bodies that do not satisfy the RLL (d, k) code and sync IDs that satisfy the RLL (d, k) code. Here, the sync IDs contain different patterns to distinguish N different sync patterns.

FIG. 3 illustrates the data structure of an information storage medium including additional data areas D each having two additional data frames. Sync bodies and sync IDs of the information storage medium having the above data structure are shown in

Tables 1 and 2 below.

As can be seen in Table 1, a RLL (1,7) code is used, each sync body is composed of 18 bits, each sync ID is composed of 6 bits, a user data area includes 9 user data frames for sync data, and an additional data area includes two user data frames for sync data.

[Table 1]

Sync No.	18-Bit Sync Body	6-Bit Sync ID	Remark
0	001 001 010 000 000 010	000 001	User Data Area Sync Data
1	001 001 010 000 000 010	010 010	
2	001 001 010 000 000 010	101 000	
3	001 001 010 000 000 010	100 001	
4	001 001 010 000 000 010	000 100	
5	001 001 010 000 000 010	001 001	
6	001 001 010 000 000 010	010 101	
7	001 001 010 000 000 010	010 000	
8	001 001 010 000 000 010	101 010	
9	001 001 010 000 000 010	100 101	Additional Data Area Sync Data
10	001 001 010 000 000 010	101 001	

As can be seen in Table 2, a RLL (2,10) code is used, each sync body is composed of 22 bits, each sync ID is composed of 10 bits, a user data area includes 7 user data frames for sync data, and an additional data area includes 2 user data frames for sync data.

[Table 2]

Sync No.	22-Bit Sync Body	10-Bit Sync ID	Remark
0	100 001 000 000 000 000 010 0	010 001 000 1	User Data Area Sync Data
1	100 001 000 000 000 000 010 0	000 100 100 1	
2	100 001 000 000 000 000 010 0	010 000 010 0	
3	100 001 000 000 000 000 010 0	001 000 000 0	
4	100 001 000 000 000 000 010 0	100 100 100 0	

5	100 001 000 000 000 000 010 0	010 000 100 0	
6	100 001 000 000 000 000 010 0	000 010 000 0	
7	100 001 000 000 000 000 010 0	010 001 000 1	Additional Data
8	100 001 000 000 000 000 010 0	010 010 010 0	Area Sync Data

As shown in Tables 1 and 2, the sync data in the additional data area has different patterns as the sync data in the user data area. In other words, the sync IDs of the second sync patterns 23 are composed of sync patterns not used as the first sync patterns 13. Therefore, the additional data areas D can be managed with being distinctly differentiated from the user data areas C.

A method of recording information on and/or reproducing information from the information storage medium having the above-described structure will be described.

As shown in FIG. 2, the user data areas C including basic ECC recording blocks and the additional data areas D located before and/or after the user data areas C are prepared in the information storage medium. Next, the second sync patterns 23 used in the additional data areas D are formed differently from the first sync patterns 13 used in the user data areas C.

Here, the second sync patterns 23 are plural and arranged at equal intervals. It is preferable that the second sync patterns 23 are arranged in the additional data areas D so that the size of each of user data 11 in the user data areas C is equal to the size of each of additional data 21 in the additional data areas D.

Sync data in the additional data areas D contains sync bodies composed of second sync patterns that do not comply with the RLL (d, k) code and sync IDs composed of second sync patterns that comply with the RLL (d, k) code. The total size of additional data 21 in the additional data areas D is integral multiplies of the size of user data 11 recorded between two first sync patterns 13a and 13 b.

While the present invention has been particularly shown and described with reference to exemplary embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present invention as defined by the following claims.

[Effect of the Invention]

As described above, an information storage medium and a method of recording information thereon and/or reproducing information therefrom according to the present invention can maintain consistency with the formats of different types of recordable information storage media and have reproduction compatibility in a drive.

Also, since sync patterns used in user data areas can be formed differently from sync patterns used in additional data areas, the additional data areas can be further efficiently separated from the user data areas.

Furthermore, by uniformly maintaining the length of data recorded in the user data areas and the additional data areas, sync signals can be detected at regular intervals in all areas during reproducing of data. Thus, it is advantageous to restore the sync signals.

What is claimed is:

1. An information storage medium comprising a user data area in which user data is recorded and an additional data area located in at least one of areas before and after the user data area, wherein second sync patterns used in the additional data area are different from first sync patterns used in the user data area.

2. The information storage medium of claim 1, wherein the sync patterns are plural and arranged at equal intervals.

3. The information storage medium of claim 2, wherein the second sync patterns are arranged in the additional data area so that the size of each of user data recorded in the user data area is equal to the size of each of additional data recorded in the additional data area.

4. The information storage medium of claim 3, wherein sync data recorded in the additional data area comprises:

sync bodies including second sync patterns that do not satisfy a RLL (d, k) code; and

sync identifications including second sync patterns that satisfy the RLL (d, k) code.

5. The information storage medium of claim 3, wherein the user data area comprises a plurality of first sync patterns, and the total size of additional data recorded in the additional data area is integral multiplies of the size of user data recorded between two adjacent first sync patterns.

6. The information storage medium of claim 1 or 2, wherein the user data area comprises a plurality of first sync patterns, and the total size of additional data recorded in the additional data area is integral multiplies of the size of user data recorded between two adjacent first sync patterns.

7. The information storage medium of claim 6, wherein sync data recorded in the additional data area comprises:

sync bodies including second sync patterns that do not satisfy a RLL (d, k) code; and

sync identifications including second sync patterns that satisfy the RLL (d, k) code.

8. The information storage medium of claim 1 or 2, wherein sync data recorded in the additional data area comprises:

sync bodies including second sync patterns that do not satisfy a RLL (d, k) code; and

sync identifications including second sync patterns that satisfy the RLL (d, k) code.

9. A method of recording information on and/or reproducing information from an information storage medium, the method comprising:

preparing a user data area in which user data is recorded and an additional data area located in at least one of areas before and after the user data area; and

forming second sync patterns used in the additional data area differently from first sync patterns used in the user data area.

10. The method of claim 9, wherein the second sync patterns are plural and arranged at equal intervals.

11. The method of claim 9 or 10, wherein the second sync patterns are arranged in the additional data area so that the size of each of user data recorded in the user data area is equal to the size of each of additional data recorded in the additional data area.

12. The method of claim 11, wherein sync data recorded in the additional data area comprises:

sync bodies including second sync patterns that do not satisfy a RLL (d, k) code; and

sync identifications including second sync patterns that satisfy the RLL (d, k) code.

13. The method of claim 12, wherein the user data area comprises a plurality of first sync patterns, and the total size of additional data recorded in the additional data area is integral multiplies of the size of user data recorded between two adjacent first sync patterns.

14. The method of claim 9 or 10, wherein the user data area comprises a plurality of first sync patterns, and the total size of additional data recorded in the additional data area is integral multiplies of the size of user data recorded between two adjacent first sync patterns.

15. The method of claim 14, wherein sync data recorded in the additional data area comprises:

sync bodies including second sync patterns that do not satisfy a RLL (d, k) code; and

sync identifications including second sync patterns that satisfy the RLL (d, k) code.

16. The method of claim 9 or 10, wherein sync data recorded in the additional data area comprises:

sync bodies including second sync patterns that do not satisfy a RLL (d, k) code; and

sync identifications including second sync patterns that satisfy the RLL (d, k) code.

FIG. 1 (PRIOR ART)

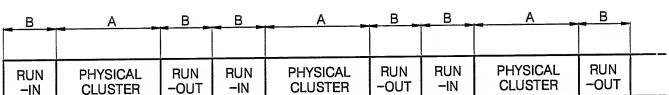

FIG. 2

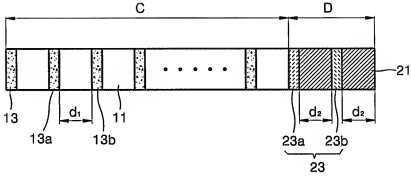

FIG. 3